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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
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LARKIN, DANIEL SEAN

ART UNIT	PAPER NUMBER
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2856

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/677,908

Applicant(s)

FRUHBERGER ET AL.

Examiner

Daniel S. Larkin

Art Unit

2856

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 March 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 21-53 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21-53 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 October 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

1. Acknowledgment is made of Applicants' preliminary amendment filed 8 March 2004. The following action takes this amendment into consideration.

#### ***Drawings***

2. The drawings are objected to because of the following:

The shading used in Figures 1-4 makes it difficult to see the lead lines as well allowing one to distinguish one structural element from another.

The text used in Figure 1 should be deleted.

The writing used in Figures 6 and 7 should all be the same size and weight of type.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

Reference numeral -- 18 -- does not appear within Figure 1 as suggested by the disclosure on page 12, paragraph [42], line 4.

4. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure

number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

5. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

6. The disclosure is objected to because of the following informalities:

Page 5, paragraph [13], lines 3 and 4: A -- comma -- should be inserted prior to the term "such".

Page 5, paragraph [14], line 6: The article -- a-- should be inserted prior to the term "reactive"; and the verb "are" should be corrected to read -- is --.

Page 12, paragraph [39], line 4: A -- period -- should be inserted after the term "shifts".

Page 12, paragraph [42], line 6: A -- comma -- should be inserted after the term "Preferably".

Page 13, paragraph [44], line 2: The term "he" should be corrected to read -- the --.

Appropriate correction is required.

### ***Claim Objections***

7. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claims 32-54 has been renumbered 31-53. Claim 31 has not been accounted for in the new amendment.

Art Unit: 2856

8. Claims 32, 33, 37, 38, 41-50, 52, and 53 are objected to because of the following informalities:

Re newly renumbered claims 32 and 33: The claim dependency should be corrected from "32" to -- 31 --.

Re newly renumbered claims 37 and 38: The claim dependency should be corrected from "37" to -- 36 --.

Re newly renumbered claims 41, 42, 45, 46, 48, 49, and 52: The claim dependency should be corrected from "41" to -- 40 --.

Re newly renumbered claims 43 and 44: The claim dependency should be corrected from "43" to -- 42 --.

Re newly renumbered claim 47: The claim dependency should be corrected from "47" to -- 46 --.

Re newly renumbered claim 50: The phrase "the chemical" lacks antecedent basis.

Re newly renumbered claim 53: The claim dependency should be corrected from "51" to -- 50 --. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. The term "dense" in claims 21, 40, 50, and 51 is a relative term which renders the claim indefinite. The term "dense" is not defined by the claim, the specification does not

provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Specifically, one is unclear as to how thick or thin a layer or how compact the layer needs to be to qualify as a dense layer.

11. Claim 41 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 41, claim lines 4 and 5: How does the sensing circuit utilize a piezoresistance sensing circuit or an optical level to measure deflection of the microcantilever when claim 40 has previously established that a change in capacitance is sensed, which is indicative of a deflection of the microcantilever?

### ***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 21, 40-42, 48, and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,445,008 (Wachter et al.).

With respect to the limitations of claim 21, the reference to Wachter et al. discloses a microbar sensor for sensing targeted chemicals or compounds, comprising: a microcantilever/microbar beam (12); and a reactive layer deposited on the beam

configured to expand as it absorbs the chemical and causing an increase in the oscillatory mass of the beam, which in effect causes deflection of the beam.

With respect to the limitation of claims 40 and 41, the reference to Wachter et al. discloses a microbar sensor for sensing targeted chemicals or compounds, comprising: a microcantilever/microbar beam (12, 54); a reactive layer deposited on the beam configured to expand as it absorbs the chemical and causing an increase in the oscillatory mass of the beam, which in effect causes deflection of the beam; a stationary base plate/transducer (10, 52); and a sensing circuit utilizing capacitance measurement to determine the amount of chemical present in the atmosphere, col. 5, lines 18-21.

With respect to the limitation of claim 42, the reference discloses that the concentration of the target chemical is determined, so it is the examiner's position that some form of processing unit is inherent to the operability of the Wachter et al. invention.

With respect to the limitation of claim 48, the reference discloses, as shown in Figure 3, a plurality of microbar sensors (54) each having a different absorption/adsorption characteristic.

With respect to the limitation of claim 52, the reference discloses that the sensor signals detection of the chemical that is to be targeted.

14. Claims 21, 29, 39-42, 45, 48-50, 52, and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,918,263 (Thundat).

With respect to the limitations of claim 21, the reference to Thundat



Art Unit: 2856

discloses a microcantilever detector for explosives, comprising: a microcantilever (4); and a reactive layer (6) deposited on the beam configured to expand as it absorbs the chemical and causing a sudden variation in the bending of the microcantilever after the absorbed materials undergo auto-combustion from heating of the microcantilever.

With respect to the limitation of claim 29, the reference to Thundat discloses that the coating (6) may comprise a metal film, such as platinum, col. 5, lines 65 and 66.

With respect to the limitation of claim 39, the reference to Thundat discloses that the microcantilever is sensitive to hydrogen.

With respect to the limitation of claims 40, the reference to Thundat discloses a microcantilever detector for explosives, comprising: a microcantilever (4); and a reactive layer (6) deposited on the beam configured to expand as it absorbs the chemical and causing a sudden variation in the bending of the microcantilever after the absorbed materials undergo auto-combustion from heating of the microcantilever; a stationary base plate/frame (2); and a sensing circuit utilizing capacitance measurement to determine the amount of chemical present in the atmosphere, col. 5, lines 67-68 through col. 6, lines 1-2.

With respect to the limitations of claim 41, the reference to Thundat discloses that the microcantilever movement or deflection can be detected by optical techniques or piezoresistance, or capacitance variation, col. 5, lines 67-68 through col. 6, lines 1-2.

With respect to the limitation of claim 42, the reference discloses that the presence of an explosive is monitored, so it is the examiner's position that some form of processing unit is inherent to the operability of the Thundat invention.

With respect to the limitation of claim 45, the reference to Thundat discloses that that a plot of normalized microcantilever bending, with respect to a reference microcantilever, will indicate if the chemical target gas is present.

With respect to the limitation of claim 48, the reference to Thundat discloses that the microcantilever can be incorporated into other microcantilever sensor concepts in an array design, col. 6, lines 27-29.

With respect to the limitation of claim 49, the reference to Thundat discloses that the microcantilever is sensitive to hydrogen.

With respect to the limitation of claims 40, the reference to Thundat discloses a microcantilever detector for explosives, comprising: a hydrogen sensing element; a microcantilever (4); and a reactive layer (6) deposited on the beam configured to expand as it absorbs the hydrogen and causing a sudden variation in the bending of the microcantilever after the absorbed materials undergo auto-combustion from heating of the microcantilever; a stationary base plate/frame (2); and a sensing circuit utilizing capacitance measurement to determine the amount of chemical present in the atmosphere, col. 5, lines 67-68 through col. 6, lines 1-2.

With respect to the limitation of claim 52, the reference to Thundat discloses that an operator is alerted to the presence of the target chemical, col. 4, lines 30-31.

With respect to the limitation of claim 53, the reference to Thundat discloses that the microcantilever is sensitive to hydrogen, and that one of ordinary skill in the art can modify the microcantilever to detect other species. The reference further discloses that an operator is alerted to the presence of the target chemical, col. 4, lines 30-31.

***Allowable Subject Matter***

15. The following is a statement of reasons for the indication of allowable subject matter:

Prior art was not relied upon to reject claims 22-28, 30-38, 43, 44, 46, 47 and 51 because the prior art fails to teach and/or make obvious the following:

Claims 22-28, 30-38, 43, 44, 46, and 47: Providing the above cited limitations in combination with a chemical sensing element having a microcantilever beam and a reactive layer deposited on the microcantilever beam.

Claim 51: Providing a method for depositing a dense reactive layer onto a substrate for chemical sensing, comprising using a deposition method for depositing the layer onto the substrate; and using a densifying method for concurrently densifying the reactive layer.

***Conclusion***

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The prior art to US 5,098,483 (Little et al.) discloses a method of treating spherical surface comprising using physical vapor deposition to apply an aluminum film to a surface while simultaneously operating an ion beam source to effect concurrent ion bombardment of the surface during the vapor deposition.

Art Unit: 2856

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel S. Larkin whose telephone number is 571-272-2198. The examiner can normally be reached on 8:00 AM - 5:00 PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel Larkin  
AU 2856  
13 June 2005



**DANIEL S. LARKIN**  
**PRIMARY EXAMINER**